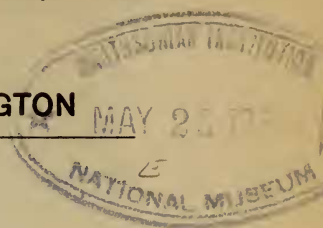


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A SYNOPSIS OF THE PHILIPPINE LAND MOLLUSKS
OF THE SUBGENUS RYSSOTA.

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On January 23, 1932, a complete report, fully illustrated, with distribution charts, on the whole genus of which this group is a part, was presented to the United States National Museum for publication. Lack of funds has prevented its issue to date. I therefore take this opportunity to render the following synopsis thereof, in the hope that it may prove helpful to students of mollusks in arranging their collections.

Any doubtful points due to the brevity of the present paper will find explanation in the completed monograph when published.

RYSSOTA Albers.

In 1850 Johann Christian Albers, in his volume of *Die Heliceen*, on page 61, defines this genus as embracing shells that have the upper surface rugose-striate and polished below, with the last whorl depressed and anteriorly dilated, and the base excavated about the perforation. Under this genus he lists 13 species without designating a type. The shells listed range from the Philippines to the isles of the Indian Ocean, the Moluccas, Ceylon and Amboina.

Ten years later Eduard von Martens, in the second edition of Albers' *Heliceen*, on page 54, brings some order into this heterogeneous group, but he still retains some extraneous species in it; for example, *Rhysota sowerbyana* Pfeiffer from the Caroline Islands. However, he clinches the matter by designating *Nanina ovum* Valenciennes as type. Von Martens emended the name *Ryssota* to *Rhysota*, which has been generally followed. I return to the original spelling.

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KEY TO THE SUBGENERA OF THE GENUS *Ryssota*.

Aperture produced at the peripheral angle.

Upper surface of last whorls not granulose.....*Ryssota*

Upper surface of last whorls granulose.....*Lamarckiella*²

Aperture not produced at the peripheral angle.....*Pararyssota*³

Subgenus RYSSOTA Albers.

Shell large and usually ponderous, the upper surface wrinkled, usually rough; the lower less so. Spiral incised lines are usually present. Aperture protracted at the peripheral angle.

Type.—*Ryssota otaheitana ovum* Valenciennes.

KEY TO THE SPECIES OF THE SUBGENUS *Ryssota*.

Shell huge and ponderous.

Shell inflated.....*otaheitana*

Shell not inflated.

Shell lenticular.....*uranus*

Shell not huge and ponderous.

Shell smaller and thin.

Shell exceedingly rough.

Periphery angulated.....*sauli*

Periphery not angulated.

Periphery rounded.....*dvitija*

Shell not exceedingly rough.

Periphery well rounded.

Last whorl rather inflated.....*sagittifera*

Last whorl not inflated.....*antoni*

Subperipheral dark band present.

Subperipheral dark band absent.....*webbi*

Periphery not well rounded.

Periphery carinated.

Upper surface flecked and marbled.....*porphyria*

Upper surface not flecked or marbled.....*mülleri*

RYSSOTA (RYSSOTA) OTAHEITANA Férussac.

Shell huge, varying in color from pale horn-colored to chestnut brown on spire and base. In some of the subspecies the spire is paler than the base,

²Subgenus LAMARCKIELLA.

Lamarckiella was proposed by von Möllendorff in 1898 in the *Abhandlungen der Naturforschenden Gesellschaft zu Görlitz*, volume 22, page 66, for *Ryssota*, whose nuclear whorls are axially wrinkled and the sculpture of whose postnuclear whorls is axially wrinkled and marked by axial and spirally incised lines, which renders the upper surface granulose, and whose periphery is sharply angulated.

He mentions *Rhysota lamarckiana* as type.

³Subgenus PARARYSSOTA.

In this subgenus the shell is huge and ponderous as in the larger species of *Ryssota*, but the aperture is not protracted at the periphery, the outer lip being evenly curved.

Type.—*Ryssota (Pararyssota) maxima* Pfeiffer,

while in others the reverse holds good; in still other races the color of the spire and base is the same. In many of the subspecies there is a narrow zone of paler color than the rest of the upper surface of the shell, immediately posterior to the periphery; in a few this narrow band is absent; in some there is a band of brown of varying width and intensity immediately anterior to the periphery. In all the subspecies there are more or less strongly developed, retractively slanting, varicial streaks of varying width, which are usually of a little deeper shade of brown than the color of the shell. The first nuclear whorl is usually flattened and marked by a few distantly spaced, broad, low, decidedly retractively slanting wrinkles; the rest of the nuclear turns are marked by closely spaced, slender, retractively slanting, axial riblets, and numerous, fine spiral lirations. Post-nuclear whorls with or without a shoulder at the summit, which may or may not be tabulated. The last whorl may be well rounded, flattened, or flattened on the side between the shoulder near the summit and the periphery. The postnuclear whorls are marked by wrinkle-like riblets which are of irregular strength and spacing, and decidedly retractively slanting. In addition to this, low, spiral lirations of varying width are usually present, also exceedingly fine, closely spaced, spiral striations. In some of the subspecies we have in addition to the above sculpture, oblique wrinkles, which range from strong to obsolete in the different forms. Suture well impressed; periphery of the last whorl varying from strongly angulated to rounded in the different subspecies. Base inflated, with the umbilical area well impressed, marked like the spire, but with the fine spiral striations absent. The sculpture of the base varies materially in strength in the different subspecies. Aperture large, very oblique; peristome in some forms very heavily thickened with a callus, while in other forms it is thin. In all the subspecies the aperture is rather drawn out at the periphery and the outer lip is usually protracted between the summit and the periphery, the inner lip almost paralleling it. In some of the races the outer lip is in-bent at the edge and in almost all of them the inner lip is in-bent, thus materially contracting the aperture. In all of the subspecies the inner lip is broadly expanded at its insertion where it is reflected over the umbilicus, which it usually covers as a heavy callus; the parietal wall is covered with a callus of varying strength, depending upon the race in question. The interior of the aperture may be white, bluish white, or bluish white with a purplish tinge.

This species ranges from central Luzon south to Samar, Leyte, Cebu, Negros and Panay, and is also found on some of the off-lying islands of eastern Luzon. It is the largest one of the Philippine Island ground land shells and is used as food by the natives.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) otaheitana*.

Upper and lower surface of the last whorl of the same color.

Shell unicolor.

Shell horn-colored.....*catanduanensis*

Shell not horn-colored.

Shell pale chestnut brown.....*ovum*

Shell not unicolor.

Early whorls pale chestnut brown.

Last whorl pale horn-colored.....*calayanensis*

Last whorl not pale horn-colored.

Last whorl brownish horn-colored.....*bataana*

Upper and lower surface of the last whorl not of the same color.

Base darker than upper surface.

Supraperipheral area with a light zone.

Outer lip ponderous in adult shells.

Last whorl rounded.....*cebuensis*

Last whorl not rounded.

Last whorl flattened.

Greater diameter more than 80 mm.

Aperture decidedly channeled at the peripheral angle.

Base strongly spirally lirate.....*samarensis*

Base not strongly spirally lirate.

Base obsoletely spirally lirate.....*buriasensis*

Aperture not decidedly channeled at the peripheral angle.

Base very dark chestnut brown.....*maquilingana*

Base not very dark chestnut brown.

Base pale.....*worcesteri*

Greater diameter less than 80 mm.

Surface of shell very rough.....*rhea*

Surface of shell not very rough.....*humerosa*

Outer lip not ponderous.

Outer lip rather thin.

Surface of the shell very rough.....*humilis*

Surface of the shell not very rough.

Shell dark chestnut brown.

Shell strong.....*otaheitana*

Shell not strong.

Shell very thin.....*romblonensis*

Shell not dark chestnut brown.

Shell brownish horn-colored.....*pagbilaeonsis*

Supraperipheral area without light zone.

Greater diameter more than 110 mm.....*pilsbryi*

Greater diameter less than 100 mm.....*batanensis*

Base not darker than upper surface.

Base lighter than upper surface.

Shell depressed.....*depressa*

Shell not depressed.....*demesai*

The characterizations in the above key together with the locality data and type designation following will help in bringing the salient features pertaining to the various races to attention.

Ryssota (Ryssota) otaheitana catanduanensis, new subspecies.

This race comes from Catanduanes Island. The type, U. S. N. M. No. 311502, has 5.4 whorls and measures: Height 52.2 mm.; greater diameter 77.5 mm.; lesser diameter 61.1 mm.

Ryssota (Ryssota) otaheitana ovum Valenciennes.

This race I now restrict to the region about Manila. A specimen from Lagunas, U. S. N. M. No. 66202, has 5.4 whorls and measures: Height 61.0 mm.; greater diameter 80.1 mm.; lesser diameter 61.8 mm.

Ryssota (Ryssota) otaheitana calayanensis, new subspecies.

This race comes from Calayan Island of the Babuyan group. The type, U. S. N. M. No. 311505, has 5.1 whorls and measures: Height 42.3 mm.; greater diameter 63.1 mm.; lesser diameter 49.0 mm.

Ryssota (Ryssota) otaheitana bataana, new subspecies.

This subspecies comes from Bataan Province, Luzon. The type, U. S. N. M. No. 311506, was collected at Mariveles. It has 5.4 whorls and measures: Height 48.5 mm.; greater diameter 68.2 mm.; lesser diameter 53.3 mm.

Ryssota (Ryssota) otaheitana cebuensis, new subspecies.

This race comes from the Island of Cebu. The type, U. S. N. M. No. 195663, has 5.4 whorls and measures: Height 60.2 mm.; greater diameter 90.6 mm.; lesser diameter 88.7 mm.

Ryssota (Ryssota) otaheitana samarensis, new subspecies.

This subspecies comes from the Island of Samar. The type, U. S. N. M. No. 195662, has 5.3 whorls and measures: Height 59.0 mm.; greater diameter 88.6 mm.; lesser diameter 65.4 mm.

Ryssota (Ryssota) otaheitana buriasensis, new subspecies.

This race comes from Burias Island. The type, U. S. N. M. No. 256371, has 5.3 whorls and measures: Height 56.7 mm.; greater diameter 84.0 mm.; lesser diameter 64.1 mm.

Ryssota (Ryssota) otaheitana maquilingana, new subspecies.

This race appears to be confined to Mount Maquiling, Luzon. The type, U. S. N. M. No. 310515, has 5.7 whorls and measures: Height 58.3 mm.; greater diameter 83.0 mm.; lesser diameter 64.9 mm.

Ryssota (Ryssota) otaheitana worcesteri, new subspecies.

This race comes from the region of Ragay Gulf, Luzon. The type, U. S. N. M. No. 311509, was collected at Pasacao. It has 5.6 whorls and measures: Height 60.3 mm.; greater diameter 90.6 mm.; lesser diameter 69.7 mm.

Ryssota (Ryssota) otaheitana rhea Pfeiffer.

This race comes from Panay. A specimen of it, U. S. N. M. No. 184622, has 5.0 whorls and measures: Height 44.5 mm.; greater diameter 64.8 mm.; lesser diameter 49.7 mm.

This is one of the smallest subspecies of *Ryssota (Ryssota) otaheitana* and is one of the most strongly characterized, having rougher sculpture on the upper surface of the whorls than any so far observed.

Ryssota (Ryssota) otaheitana humerosa Möllendorff.

This race occupies the southern and southeastern part of the Island of Mindoro. A specimen, U. S. N. M. No. 7590, has 5.5 whorls and measures: Height 53.7 mm.; greater diameter 76.0 mm.; lesser diameter 57.5 mm. It differs from *Ryssota (Ryssota) otaheitana demesai* in having the base darker than the upper surface of the shell. This subspecies occupies the northeastern part of the Island of Mindoro.

Ryssota (Ryssota) otaheitana humilis Möllendorff.

This race comes from the Island of Guimaras. A specimen, U. S. N. M. No. 184629, has 4.8 whorls and measures: Height 30.0 mm.; greater diameter 57.7 mm.; lesser diameter 45.6 mm.

Ryssota (Ryssota) otaheitana otaheitana Férussac.

Specimens from the Island of Sibuyan in every way satisfy the figure and description by Férussac. I therefore restrict the name to this race. A specimen, U. S. N. M. No. 311515, from the above locality, has 5.3 whorls and measures: Height 52.7 mm.; greater diameter 80.5 mm.; lesser diameter 62.7 mm.

***Ryssota (Ryssota) otaheitana romblonensis*, new subspecies.**

This race comes from the Island of Romblon. The type, U. S. N. M. No. 256260, has 5.4 whorls and measures: Height 58.0 mm.; greater diameter 88.4 mm.; lesser diameter 67.4 mm.

***Ryssota (Ryssota) otaheitana pagbilaoensis*, new subspecies.**

This race comes from Pagbilao Island off Luzon. The type, U. S. N. M. No. 311516, has 5.6 whorls and measures: Height 51.0 mm.; greater diameter 81.4 mm.; lesser diameter 61.4 mm.

***Ryssota (Ryssota) otaheitana batanensis*, new subspecies.**

This race comes from the Island of Batan off the east coast of Luzon. The type, U. S. N. M. No. 256373, has 5.6 whorls and measures: Height 61.0 mm.; greater diameter 93.6 mm.; lesser diameter 74.4 mm.

Ryssota (Ryssota) otaheitana depressa, Möllendorff.

This race comes from the Island of Marinduque. A specimen, U. S. N. M. No. 195666, has 5.3 whorls and measures: Height 46.5 mm.; greater diameter 75.3 mm.; lesser diameter 61.2 mm.

Ryssota (Ryssota) otaheitana demesai, new subspecies.

This subspecies comes from the northeastern part of Mindoro. The type, U. S. N. M. No. 382956, comes from the base of Mount Halcon. It has 5.8 whorls and measures: Height 60.0 mm.; greater diameter 84.0 mm.; lesser diameter 72.0 mm.

Ryssota (Ryssota) otaheitana pilsbryi, new name.

The gigantic size of this race will readily distinguish it from the rest. Neither Dr. Pilsbry's material nor that in our collection bears specific locality data. It probably came from southern Luzon. U. S. N. M. No. 346626, has 5.5 whorls and measures: Height 66.0 mm.; greater diameter 110.1 mm.; lesser diameter 88.0 mm. (= *Rhysota maxima gigas* Pilsbry, not *Rhysota sagitifera gigas* Möllendorff.)

RYSSOTA (RYSSOTA) URANUS Pfeiffer.

Shell large, almost lenticular. The first nuclear whorl almost flattened, marked by a few broad, depressed, retractively slanting, axial wrinkles. The rest of the nuclear whorls are marked by more closely spaced, irregularly developed, retractively slanting, axial riblets, and numerous fine spiral lirations. Postnuclear whorls moderately rounded, marked by poorly developed, retractively slanting, riblike wrinkles, which are of irregular strength and spacing and between which fine incremental lines are present. There are also very closely spaced, exceedingly fine, spiral striations present on the upper surface. Periphery of the last whorl strongly angulated. Base marked by rather closely spaced, wrinkle-like riblets. The fine incised spiral lines mentioned for the upper surface are absent on the base. The umbilical area is moderately impressed and usually only half covered by the callus. Aperture very broadly oval, almost angulated at the periphery; peristome not materially thickened; inner lip expanded at the base and reflected over the umbilicus which it more than half covers; parietal wall glazed with a thick callus. Interior of aperture bluish white.

This species appears to occupy the islands off the east coast of Luzon. There are two races on Polillo Island and a giant on the Island of Maculabo of eastern Luzon. The smallest member comes from Dalupiri Island. I am not quite sure whether this is the island off the southwest coast of the Island of Samar, or the island by that name in the Babuyan group. Judging from the affinity, I am led to believe that it may be the former.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) uranus* Pfeiffer.

- Upper surface of shell horn-colored*maculaboensis*
- Upper surface of shell not horn-colored.
- Upper surface of shell brown.
- Shell rather inflated.....*angulata*
- Shell not inflated.
- Greater diameter more than 75 mm.....*dryas*
- Greater diameter less than 70 mm.
- Shell pale brown.....*uranus*
- Shell dark brown.....*dalupiriensis*

Ryssota (Ryssota) uranus maculaboensis, new subspecies.

This race comes from Maculabo Island. The type, U. S. N. M. No. 311580, has 5.2 whorls and measures: Height 55.5 mm.; greater diameter 111 mm.; lesser diameter 84.8 mm.

Ryssota (Ryssota) uranus angulata Möllendorff.

Möllendorff cites this race as coming from the Karamuan Peninsula, Luzon, and gives the following measurements of two specimens: Height 50.0 and 49.5 mm.; greater diameter 88.0 and 92.0 mm., respectively.

Ryssota (Ryssota) uranus dryas, new subspecies.

This subspecies comes from Polillo Island. The type, U. S. N. M. No. 311520, has 5.1 whorls and measures: Height 39.2 mm.; greater diameter 86.3 mm.; lesser diameter 65.7 mm.

Ryssota (Ryssota) uranus uranus Pfeiffer.

U. S. N. M. No. 315613 contains two specimens from Polillo Island, one of which has 4.8 whorls and measures: Height 31.3 mm.; greater diameter 71.4 mm.; lesser diameter 55.9 mm.

This race probably occupies a distinct range from *Ryssota (Ryssota) uranus dryas*, which also comes from Polillo Island.

Ryssota (Ryssota) uranus dalupiriensis, new subspecies.

This race comes from Dalupiri Island. The type, U. S. N. M. No. 311519, has 4.7 whorls and measures: Height 27.9 mm.; greater diameter 61.3 mm.; lesser diameter 49.1 mm.

Ryssota (Ryssota) sauli, new species.

Shell of medium size, decidedly depressed helicoid. The early whorls may be pale chestnut brown or flesh-colored, depending upon the race in question, and the rest may be pale chestnut brown or greenish horn-colored on the spire. There is always a lighter zone posterior to the periphery or a brown band or brownish band immediately anterior to the periphery, which varies in width in the different races. The rest of the base is greenish or olivaceous horn-colored. Nuclear whorls a little more than 2; the first flattened, marked by rather distantly spaced, retractively slanting, flattened, axial riblets; the rest a little more rounded and marked by numerous, closely spaced, retractively slanting, axial riblets and numerous, spiral lirations. Postnuclear whorls somewhat flattened at the summit, slightly rounded on the rest of the turns, with the periphery conspicuously angulated. They are marked by irregular and irregularly developed, retractively slanting, axial riblets and numerous, spiral threads, which are of varying strength and spacing. These are less conspicuous on the last whorl than on the preceding one, but on the last turn there are also very strong, oblique wrinkles which give to the entire surface a very rough appearance. These wrinkles are a little less pronounced on the preceding

turn. Base moderately rounded with a well-impressed umbilical area, marked by retractively slanting, axial riblets, slender spiral lirations, and numerous, oblique wrinkles which are particularly strongly expressed near the periphery. Aperture large, oblique; the peristome slightly reinforced at the edge; outer lip evenly curved between the summit and the periphery and somewhat protracted, from the periphery basally being slightly retracted; inner lip somewhat sinuous; columella expanded and reflected over the base, almost covering the umbilicus.

Three subspecies of this species are recognized at the present; they come from the Islands of Panay, Guimaras and Burias.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) sauli*.

- Nuclear whorl flesh-colored.....*igbarasana*
- Nuclear whorl not flesh-colored.
 - Nuclear whorls pale brown.
 - Base horn-colored.....*elerai*
 - Base not horn-colored.
 - Base olivaceous horn-colored.....*sauli*

***Ryssota (Ryssota) sauli igbarasana*, new subspecies.**

The type, U. S. N. M. No. 311555, of this race, comes from Igaras, Panay. It has 4.4 whorls and measures: Height 33.3 mm.; greater diameter 59.0 mm.; lesser diameter 45.5 mm.

***Ryssota (Ryssota) sauli elerai*, new subspecies.**

This race comes from the Island of Burias. The type, U. S. N. M. No. 311559, has 4.5 whorls and measures: Height 32.2 mm.; greater diameter 58.2 mm.; lesser diameter 44.6 mm.

***Ryssota (Ryssota) sauli sauli*, new subspecies.**

The typical race comes from the Island of Guimaras. The type, U. S. N. M. No. 311557, has 4.4 whorls and measures: Height 31.1 mm.; greater diameter 56.3 mm.; lesser diameter 43.5 mm.

RYSSOTA (RYSSOTA) DVITIJA O. Semper.

Shell of medium size, helicoid, covered with a rather thick periostracum which may be horn-colored with a brownish tinge or pale chestnut brown, toward the center of the base, becoming a little paler than on the spire. Nuclear whorls 2.3, slightly rounded, the early portion covered by a few broad, low, retractively slanting wrinkles, the rest by ill-defined, irregular, retractively slanting axial riblets which are a little stronger near the summit than on the rest of the shell, and a few irregular and irregularly distributed, incised, spiral lines. Postnuclear whorls moderately rounded, marked by ill-defined, retractively slanting, axial riblets which are more or less interrupted by numerous, coarse, more or less oblique wrinkles which are particularly strong on the last turn. Suture well impressed. Periphery of the last whorl with the merest indication of an angle. Base strongly

inflated, well rounded, slightly impressed at the umbilicus, marked by poorly developed, retractively slanting riblets and numerous, oblique wrinkles, the latter considerably weaker than on the spire. Aperture rather large, oblique, irregular, auriculate; peristome slightly thickened at the edge; the outer lip somewhat protracted between the summit and periphery, strongly curved; basal equivalent almost as strongly curved as that between summit and periphery; inner lip somewhat sigmoid, expanded at the base where it is reflected over the umbilicus which it almost closes as a white callus; both the inner and outer lips are slightly in-bent and somewhat contract the aperture; parietal wall covered with a thin callus.

This species appears to be the high mountain form which seems to have its center of distribution in the Benguet region.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) divitija*.

Aperture very large.

Aperture rather high.....*divitija*

Aperture not rather high.

Aperture rather low.....*polioana*

Aperture not very large.

Aperture rather short.....*benguetana*

Ryssota (Ryssota) divitija divitija Semper.

A topotype, U. S. N. M. No. 110074, from Mount Data, Luzon, has 4.2 whorls and measures: Height 24.5 mm.; greater diameter 42.4 mm.; lesser diameter 39.9 mm.

Ryssota (Ryssota) divitija polioana, new subspecies.

This race comes from Mount Polio, Mountain Province, Luzon. The type, U. S. N. M. No. 256399, has 4.4 whorls and measures: Height 24.0 mm.; greater diameter 43.8 mm.; lesser diameter 33.5 mm.

Ryssota (Ryssota) divitija benguetana, new subspecies.

This subspecies comes from Heights-in-the-Oaks, Benguet Province, Luzon, where it was collected at an altitude of 7000 feet. The type, U. S. N. M. No. 311561, has 4.1 whorls and measures: Height 21.8 mm.; greater diameter 38.3 mm.; lesser diameter 35.0 mm.

RYSSOTA (RYSSOTA) SAGITTIFERA Pfeiffer.

Shell rounded, ranging in size from rather large to small. The early whorls are almost always darker than the later, on the upper surface, and the basal portion almost always a shade darker than the upper part of the last whorl. There is a subperipheral band of varying width and shades of brown in all the races but *Ryssota (Ryssota) sagittifera richi*. The upper and lower surfaces are marked with arrow-shaped dashes of brown. These sometimes are very conspicuous, while at others they are merely indicated. The base of the last whorl is conspicuously inflated and very strongly rounded. The nuclear whorls usually consist of a little more than two turns,

the first of which, as a rule, is somewhat flattened and marked by a few distantly spaced, low, broad, retractorily slanting, axial riblets, while the rest of the nuclear turns are marked by closely spaced, retractorily slanting axial threads, and numerous incised spiral lines. The upper surface of the postnuclear whorls is marked by rather irregularly developed and distributed, retractorily curved, riblets (the sculpture scarcely merits the name riblets), and incised spiral lines which vary in width and spacing. Frequently they are so closely spaced that the elements between them appear as elevated lirations, and when that takes place we usually have the axial threads cut up into fine tubercles. Sometimes we have in addition to this, incised spiral lines, also, numerous, closely spaced, microscopic spiral striations. The last whorl, also, usually has oblique wrinkles. These vary materially in strength in the different races and their strength determines the comparative smoothness or roughness of this part of the shell. The periphery of the last whorl is almost rounded and there is never more than a mere indication of an obsolete angulation present. The base is marked by the continuation of the axial riblets and spiral striations which vary in width and strength in the different races, and also numerous, fine, oblique wrinkles which give to the base a scratched-up appearance. All these basal elements vary in strength in the different forms and therefore produce the difference in sculpture characterized for the different races. The umbilical area also is somewhat variable in the depths of its impression, and the umbilicus may be narrowly open or closed with a plug. The aperture is usually large and varies in color within from bluish white to pale brown and to livid. The dark peripheral streak, as well as the arrow-shaped markings, are usually discernible within. The peristome is frequently slightly reinforced with a slender callus, and the outer lip is protracted between the summit and the periphery and retracted between the periphery and base. The inner lip varies from almost straight to somewhat sigmoid. The columella is always expanded and reflected to cover about half of the umbilicus and the parietal wall is covered with a callus which varies in thickness from a mere film to a rather heavy deposit.

This species ranges from northwestern Luzon through central Luzon, but apparently does not extend to the northeastern part of the island. It is closely related to *Ryssota (Ryssota) antoni*, from which it may be distinguished by its usually smoother sculpture, by the presence of the arrow marks which are practically always absent in *Ryssota (Ryssota) antoni*, though not always so, and by having the basal portion of the whorls more inflated and rounded. The color of *Ryssota (Ryssota) antoni* also is, as a rule, much darker than that of *Ryssota (Ryssota) sagittifera*.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) sagittifera* Pfeiffer.

Greater diameter more than 58 mm.

Arrow marks on base abundant and strong.....*gigas*

Arrow marks on base few and obsolete.....*sagittifera*

Greater diameter less than 52 mm.

Arrow marks strong on the upper surface.

Greater diameter more than 46 mm.....*eldi*

Greater diameter less than 43 mm.....*globosa*

Arrow marks not strong on the upper surface.

Arrow marks scattered and usually faintly expressed.

Greater diameter more than 45 mm.

Arrow marks on base numerous.....*bulacana*

Arrow marks on base not numerous.....*isabelana*

Greater diameter less than 45 mm.

Axial riblets rather strong.

Upper surface of shell brown or pale brown.

Aperture very high.....*ecijana*

Aperture not very high.....*solida*

Upper surface of shell not brown or pale brown.

Upper surface of shell horn-colored.....*uniona*

Axial riblets not strong.

Peripheral brown zone very narrow.

Spiral threads of last whorl coarse.....*morongana*

Spiral threads of last whorl not coarse.....*tarlacana*

Peripheral brown zone not very narrow.....*montalbana*

Arrow marks not scattered nor faintly expressed.

Arrow marks apparently absent.....*richi*

Ryssota (Ryssota) sagittifera gigas Möllendorff.

The type locality for this race is Pamploma, Cagayan Province, Luzon. I have not seen specimens of this, but Möllendorff's figure measures: Height 39.0 mm.; greater diameter 66.0 mm.; lesser diameter 52.5 mm.

Ryssota (Ryssota) sagittifera sagittifera Pfeiffer.

The typical race comes from Mount Sinait, Luzon. U. S. N. M. No. 116572, a cotype, has 4.7 whorls and measures: Height 35.5 mm.; greater diameter 59.4 mm.; lesser diameter 46.8 mm.

***Ryssota (Ryssota) sagittifera eldi*, new subspecies.**

This race was collected by the U. S. Exploring Expedition. The type, U. S. N. M. No. 7591, does not bear a specific label. It has 4.7 whorls and measures: Height 28.9 mm.; greater diameter 46.8 mm.; lesser diameter 36.6 mm.

***Ryssota (Ryssota) sagittifera globosa*, new subspecies.**

The type locality of this race is Mount Bulagao, Ilocos Sur, Luzon. The type, U. S. N. M. No. 311527, has 4.9 whorls and measures: Height 26.8 mm.; greater diameter 42.0 mm.; lesser diameter 33.4 mm.

***Ryssota (Ryssota) sagittifera bulacana*, new subspecies.**

This race comes from the region of Sibul Springs, Luzon. The type, U. S. N. M. No. 311525, has 4.9 whorls and measures: Height 29.2 mm.; greater diameter 51.0 mm.; lesser diameter 38.8 mm.

Ryssota (Ryssota) sagittifera isabelana, new subspecies.

This race comes from Cawayan, Nueva Vizcaya, Luzon. The type, U. S. N. M. No. 311563, has 4.8 whorls and measures: Height 32.8 mm.; greater diameter 47.8 mm.; lesser diameter 38.2 mm.

Ryssota (Ryssota) sagittifera ecijana, new subspecies.

This race comes from Bongabong, Nueva Ecija, Luzon. The type, U. S. N. M. No. 311564, has 4.8 whorls and measures: Height 28.2 mm.; greater diameter 43.3 mm.; lesser diameter 33.0 mm.

Ryssota (Ryssota) sagittifera solida Möllendorff.

This race was described from Dingalan, Tayabas, Luzon. A topotype, U. S. N. M. No. 184829, has 4.7 whorls and measures: Height 26.7 mm.; greater diameter 42.2 mm.; lesser diameter 33.4 mm.

Ryssota (Ryssota) sagittifera uniona, new subspecies.

This race comes from La Union Province, Luzon. The type, U. S. N. M. No. 311565, has 4.5 whorls and measures: Height 29.3 mm.; greater diameter 39.8 mm.; lesser diameter 31.2 mm.

Ryssota (Ryssota) sagittifera morongana, new subspecies.

This subspecies comes from Morong, Rizal Province, Luzon. The type, U. S. N. M. No. 311566, has 4.8 whorls and measures: Height 26.0 mm.; greater diameter 41.0 mm.; lesser diameter 32.3 mm.

Ryssota (Ryssota) sagittifera tarlacana, new subspecies.

This race comes from the region of Tarlac, Luzon. The type, U. S. N. M. No. 195660, has 4.7 whorls and measures: Height 24.4 mm.; greater diameter 42.4 mm.; lesser diameter 32.8 mm.

Ryssota (Ryssota) sagittifera montalbana, new subspecies.

This race comes from Montalban, Luzon. The type, U. S. N. M. No. 256306, has 4.8 whorls and measures: Height 26.7 mm.; greater diameter 44.4 mm.; lesser diameter 34.6 mm.

Ryssota (Ryssota) sagittifera richi, new subspecies.

This subspecies was collected by the U. S. Exploring Expedition, probably on Mount Banahao or Mount Maquiling. The type, U. S. N. M. No. 311530, measures: Height 27.0 mm.; greater diameter 47.9 mm.; lesser diameter 35.7 mm.

RYSSOTA (RYSSOTA) ANTONI Semper.

Shell large to medium size, usually of dark coloration; chestnut brown predominates on the upper surface, though frequently the upper surface is horn-colored with a brownish tint. The under surface of the last whorl is usually darker than the upper surface. The shell, however, may be of

horn color throughout. There is also a rather broad, subperipheral brown zone which gradually fades into the basal coloration anteriorly. As a rule, there are no arrow markings, but in *Ryssota (Ryssota) antoni belophora* arrow marks are present on both the upper and lower surfaces. The nuclear whorls consist of a little more than two turns, the first of which is usually slightly flattened and marked by a few low, broad, distantly spaced, retractively slanting, axial ribs; the rest of the nuclear turns are marked by numerous, slender, retractively slanting, closely spaced, axial riblets and many incised spiral lines. The rest of the whorls are marked by irregular and irregularly spaced, retractively slanting, axial riblets, and incised spiral lines which vary materially in width of spacing and strength in the various subspecies, and not infrequently so cut the axial riblets as to render the upper surface almost granulose. In addition to this, the last whorl, or the last two whorls, may be marked by oblique wrinkles which again vary materially in strength in the different subspecies and add to the roughness of the upper surface of the shell. Periphery of the last whorl scarcely angulated. Base well rounded, but hardly inflated, marked by the continuations of the axial riblets, incised spiral lines and oblique wrinkles, the latter varying from somewhat rough to very fine may give to the surface, particularly the posterior half of the base, a roughish appearance or merely a finely cross-hatched aspect. The umbilical area is usually but shallowly impressed, and the umbilicus, as a rule, is closed with a callus in the adult shell, though at times it is open. The peritreme of the aperture is slightly reinforced with a callus; outer lip protracted between the summit and the periphery and slightly retracted in the basal equivalent of this; the basal lip may be evenly curved or slightly sinuous; the columella is always expanded and reflected over the umbilicus. The interior of the aperture varies from bluish white to livid, the peripheral dark band usually showing within.

This species occupies the islands to the north of Luzon and extends to the islands lying off eastern Luzon, as well as the north and east coastal strip of Luzon. The member penetrating furthest into the island is *Ryssota (Ryssota) antoni sibulana*, which comes from Sibul Springs.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) antoni*.

Greater diameter more than 60 mm.

Arrow marks present.....*belophora*

Arrow marks absent.....*antoni*

Greater diameter less than 60 mm.

Upper surface of last whorl dark.

Base dark olive green.....*domingoana*

Base not dark olive green.

Base horn-colored with an olivaceous flush.

Greater diameter more than 55 mm.

Upper surface of last whorl rough.....*sibulana*

Upper surface of last whorl not rough.....*palauiensis*

Greater diameter less than 50 mm.....*canonizadoi*

Upper surface of last whorl light.

Subperipheral brown band broad.

Greater diameter more than 50 mm.....*sabtanensis*

Greater diameter less than 50 mm.*camiguinensis*

Subperipheral brown band not broad.....*babuyanensis*

Ryssota (Ryssota) antoni belophora Möllendorff.

This race comes from Tait, Luzon. A specimen from the type locality, U. S. N. M. No. 311541, has 4.8 whorls and measures: Height 34.0 mm.; greater diameter 60.0 mm.; lesser diameter 47.6.

Ryssota (Ryssota) antoni antoni Semper.

This race Semper tells us comes from northeastern Luzon. He gives the measurements for it as: Height 30.0 mm.; greater diameter 62.0 mm., and lesser diameter 48.0 mm. I have not seen specimens of it.

Ryssota (Ryssota) antoni domingoana, new subspecies.

This race comes from Batan Islands of the Batanes group. The type, U. S. N. M. No. 218756, has 4.5 whorls and measures: Height 26.4 mm.; greater diameter 50.0 mm.; lesser diameter 38.6 mm.

Ryssota (Ryssota) antoni sibulana, new subspecies.

This subspecies comes from the region of Sibul, Luzon. The type, U. S. N. M. No. 184621, has 4.6 whorls and measures: Height 31.7 mm.; greater diameter 57.6 mm.; lesser diameter 44.1 mm.

Ryssota (Ryssota) antoni palaiensis, new subspecies.

This race comes from the Island of Palau. The type, U. S. N. M. No. 311539, has 4.5 whorls and measures: Height 31.4 mm.; greater diameter 57.2 mm.; lesser diameter 45.8 mm.

Ryssota (Ryssota) antoni canonizadoi, new subspecies.

This race comes from Polillo Island. The type, U. S. N. M. No. 311540, has 4.2 whorls and measures: Height 25.0 mm.; greater diameter 44.6 mm.; lesser diameter 34.7 mm.

Ryssota (Ryssota) antoni sabtanensis, new subspecies.

This race comes from the Island of Sabtan of the Batanes group. The type, U. S. N. M. No. 256357, has 4.3 whorls and measures: Height 30.2 mm.; greater diameter 53.0 mm.; lesser diameter 41.5 mm.

Ryssota (Ryssota) antoni camiguinensis, new subspecies.

This race comes from Camiguin Island of the Babuyanes group. The type, U. S. N. M. No. 256358, has 4.2 whorls and measures: Height 27.0 mm.; greater diameter 46.3 mm.; lesser diameter 36.6 mm.

Ryssota (Ryssota) antoni babuyanensis, new subspecies.

This subspecies comes from Babuyan, Claro Island. The type, U. S. N. M. No. 311538, has 4.3 whorls and measures: Height 27.8 mm.; greater diameter 47.8 mm.; lesser diameter 37.5 mm.

Ryssota (Ryssota) webbi, new species.

Shell small, helicoid. All but the last whorl and a third pale chestnut brown, the rest horn-colored, with a few scattered arrow marks. Base dark horn-colored with a few scattered arrow marks. The subperipheral dark band usually present in species of *Ryssota* is absent in this one. Interior of aperture pale livid. Peristome yellowish white. Nuclear whorls 2.4; the first flattened, marked by rather many, retractively slanting, low, axial riblets; the rest well rounded, marked by numerous, closely spaced, wavy, retractively slanting, axial threads and many still finer spiral threads. Postnuclear whorls slightly rounded, marked by irregularly developed and spaced, retractively curved, axial riblets, and poorly impressed spiral striations. The last whorl has, in addition to this, a few oblique wrinkles which give it a somewhat malleated appearance. On the last whorl the axial sculpture is rather rougher than on the preceding turn. The periphery of the last whorl is obtusely angulated. Base well rounded and marked by the feeble continuations of the axial riblets and a few, irregular, oblique wrinkles. Aperture very oblique; peristome thickened at the edge; outer lip protracted between the summit and the periphery, quite strongly inbent, from the periphery basally it is retracted; inner lip slightly sinuous; columella short, broadly expanded and reflected over the umbilicus, which it almost covers; parietal wall covered by a rather heavy callus.

The type, U. S. N. M. No. 311568, was collected by Quadras at Ilocos Sur, Luzon. It measures: Height 25.9 mm.; greater diameter 40.7 mm.; lesser diameter 32.0 mm.

RYSSOTA (RYSSOTA) PORPHYRIA Pfeiffer.

Shell small, depressed-helicoid. Nuclear whorls chestnut brown with pale varical streaks, while the remaining turns are yellowish buff, marbled, the malleations usually appearing darker. There are also varical streaks of pale brown at scattered intervals. A narrow light streak marks the periphery and extends slightly anteriorly and posteriorly to this. On the base there is a dark zone anterior to the narrow white line at the periphery, which is covered by a suffusion of yellow. The rest of the base is yellowish buff, a little brighter yellow than the upper surface. Peristome white; interior of aperture bluish white basally with a light peripheral streak, a broad zone of brown anterior to the peripheral streak, and the region between the summit and the light zone purplish brown. Nuclear whorls 2.3; the first marked by a few, low, retractively slanting, axial riblets; the rest by closely crowded, retractively slanting, axial threads and numerous, spiral lines.

The postnuclear whorls are moderately well rounded and marked by regularly developed and distributed, retractively slanting, axial riblets and numerous, very closely spaced, slender spiral lirations, the combination of

these and the finer axial sculpture produce an exceedingly fine granular surface. In addition to this, there are low, oblique wrinkles scattered at irregular intervals. These give to the surface a malleated appearance. Periphery of the last whorl rounded, marked by the continuations of the axial ribs and moderately strongly incised spiral lines, also numerous, oblique wrinkles, which are fully as strong as those on the spire and render the posterior half of the base also malleated; the inner half is smoother. The umbilical area is moderately impressed. Aperture oblique, large; peristome slightly reinforced with a very thin callus; outer lip strongly protracted between the summit and the periphery and somewhat retracted from the periphery basally; inner lip slightly sinuous; columella expanded and reflected over the umbilicus, which it almost completely covers; parietal wall glazed with a thin callus.

The specimen described, U. S. N. M. No. 100151, comes from Pasqual, Burias. It has 5 whorls and measures: Height 27.2 mm.; greater diameter 46.4 mm.; lesser diameter 37.0 mm.

RYSSOTA (RYSSOTA) MÜLLERI Pfeiffer.

Shell depressed-helicoid, varying in color from pale chestnut brown on the early whorls to dark brown. The rest of the whorls may be horn-colored with an olivaceous tinge on the upper surface to chestnut brown, with a lighter zone of varying width immediately posterior to the periphery. Anterior to the periphery there is a broad zone of chestnut brown, while the base is usually horn-colored, though sometimes materially darker. Interior of aperture bluish white with a purplish tinge, sometimes a little darker. Nuclear whorls about 2.5; the first flattened, marked by a few, distantly spaced, retractively slanting, flattened, wrinkle-like ribs; the rest by numerous, wavy, closely spaced, retractively slanting, axial threads and numerous, closely spaced spiral lirations. Postnuclear whorls varying from slightly to moderately rounded, marked by rather irregularly developed and distributed, retractively slanting, axial riblets, and on all but the last by numerous, closely spaced, spiral threads. On the last turn these become rather obsolete on the latter portion. In addition to this the last whorl is marked by a few, oblique wrinkles which vary in strength in the different races. Periphery strongly angulated. Base depressed, moderately well rounded, marked by the continuations of the axial riblets and rather irregularly spaced, spiral lines, and numerous fine oblique wrinkles. Aperture large, oblique; the outer lip decidedly protracted between the summit and the periphery and retracted from the periphery basally; basal lip moderately curved; columella expanded and reflected over the umbilicus, which it more than half covers; parietal wall covered by a moderately thick callus.

This species seems to be confined to the Island of Mindoro and it seems quite probable that Valenciennes' *Helix stoleophora* is this species. The figure shows a decorticated specimen which strongly suggests a badly worn member of this species and the description by Möllendorff is sufficiently general that it might fit it, but until an actual examination of the type can

be made, I prefer to hold to the name *Ryssota (Ryssota) mülleri*, under which name this species is best known at the present time.

Ryssota (Ryssota) mülleri appears to break up into a number of races in Mindoro. One of the subspecies described by Möllendorff, namely, *Ryssota (Ryssota) spiriplana*, I consider a mere freak form, which may occur in any of the races, representing a little different mode of coiling, possibly induced by an injury to the shell at some period. I find such a form in *Ryssota (Ryssota) mülleri fuscescens*. I shall, therefore, cite the name under that subspecies.

KEY TO THE SUBSPECIES OF *Ryssota (Ryssota) mülleri*.

Shell very rugose on upper surface of last whorl.

Periphery strongly angulated.....*planata*

Periphery not strongly angulated.....*rugata*

Shell not rugose.

Shell very thin.

Periphery angulated.....*calawagana*

Periphery not angulated.....*calaviteana*

Shell not very thin.

Shell small.....*mülleri*

Shell large.....*fuscescens*

Ryssota (Ryssota) mülleri planata Möllendorff.

This race I have seen from Pola, Mindoro. A specimen, U. S. N. M. No. 382845, has 4.3 whorls and measures: Height 25.2 mm.; greater diameter 45.5 mm.; lesser diameter 37.4 mm.

Ryssota (Ryssota) mülleri rugata Möllendorff.

Specimens of this labeled simply "Mindoro" were received from the Möllendorff collection. One of these, U. S. N. M. No. 256292, has 4.5 whorls and measures: Height 29.7 mm.; greater diameter 52.0 mm.; lesser diameter 40.0 mm.

***Ryssota (Ryssota) mülleri calawagana*, new subspecies.**

This subspecies comes from the region of Calawagan, Municipality of Palauan, northwestern Mindoro. The type, U. S. N. M. No. 382948, has 4.4 whorls and measures: Height 24.8 mm.; greater diameter 43.7 mm.; lesser diameter 33.6 mm.

***Ryssota (Ryssota) mülleri calaviteana*, new subspecies.**

This race comes from Mount Calavite, Palauan, Mindoro. The type, U. S. N. M. No. 382951, has 4.1 whorls and measures: Height 25.2 mm.; greater diameter 42.8 mm.; lesser diameter 34.2 mm.

Ryssota (Ryssota) mülleri mülleri Pfeiffer.

U. S. N. M. No. 184633, has 4.2 whorls and measures: Height 23.7 mm.; greater diameter 41.6 mm.; lesser diameter 33.0 mm. It was collected by Möllendorff and bears the label "Mindoro" without specific designation.

Ryssota (Ryssota) mülleri fuscescens Möllendorff.

This race appears to occupy the slopes of Mount Halcon abundantly. A specimen, U. S. N. M. No. 256301, has 4.4 whorls and measures: Height 26.0 mm.; greater diameter 55.0 mm.; lesser diameter 43.3 mm.